

HVAC SPECIFICATIONS

REQUIREMENTS

All mechanical work shall be free from defects in workmanship and materials for a period of one (1) year from date of final acceptance and shall meet all local and state codes. All defects, which develop or are discovered within this period shall be repaired by the Contractor to the satisfaction of the Engineer and at no additional cost.

GENERAL

- The Contractor shall examine the site of the proposed work to determine the existing conditions that may affect his work.
- It is the intention of the Contract Drawings and Specifications to call for finished work, tested and ready for operation. All materials shall be new and of first-quality.
- All material, work, incidental accessories or other details not shown but necessary to make the work complete and perfect, and in all respects ready for operation, even if not particularly specified, shall be provided by the Contractor at no additional cost.
- The Contract Drawings are generally diagrammatic and are intended to convey the scope of work and indicate general arrangement of ductwork, pipes, and induction units. Existing ducts, pipes, utilities, etc. that are damaged during the construction period, whether or not due to the Contractor's negligence, shall be repaired or replaced by the Contractor and left in a condition satisfactory to the Engineer.
- Coordinate locations of all pipes with architectural reflected ceiling plans.
- The space around pipes, ducts, etc. penetrating rated walls, shall not exceed 1/2" and shall be packed solid with Thermafiber, Mineral Wool or equivalent non-combustible material. Perimeter shall be closed off by tight fitting metal escutcheons on both sides of this construction as required by Sections C26-504.5 (b) of N.Y.C. Building Code.

DUCTWORK

- All ductwork shall be furnished, installed and fabricated in accordance with the latest edition of the SMACNA Low and High Velocity Duct Construction Standards Manual, using prime sheets of galvanized steel. All square elbows shall be provided with turning vanes on maximum 4" centers. Provide access doors at all fire and automatic dampers for access.
- Support horizontal ducts with hangers secured to structural steel above at intervals not exceeding 8'0". Install additional steel as required.

INDUCTION UNITS

- Support and fasten units to prevent all vibration, providing all required wall brackets supporting legs and leveling devices. Units support method shall be subject to the approval of the Engineer and be similar to the method used for the existing units.
- The Contractor shall adjust induction unit performance as shown on the contract drawings.
- The air connection to the induction units shall be made with "Thermoflex" Type S-TL as manufactured by Automated Industries or approved equal, of sizes shown, but not less than the full-unit inlet size. The connections shall be sealed with Minnesota Mining & Mfg. Co. 600 sealant and clamped with Ideal Type 52 hose clamps, or approved equal. Flexible connections that penetrate any rated closures shall be installed as specified.
- Contractor shall thoroughly clean all existing induction units by means of wire brushing or steam cleaning lined surfaces, removing all dust and debris from plenum chamber, cleaning nozzles and replacing filters. All induction units thermostats shall be thoroughly checked for proper operation and recalibrated where required, or replaced if not functional.

PIPING

All piping connecting to the induction unit shall be Copper ASTM B-88, soft (annealed) Type L and fittings shall be standard weight copper and solder type. All soldered joints shall be made with 95-5 Tin Antimony Solder having a melting point greater than 450 Deg. F. All soldered joints shall be thoroughly cleaned before the application of the solder. All insulation shall match existing.

WATER COOLED AIR CONDITIONING UNIT

- Furnish and install a packaged air conditioning unit. Unit shall be complete with temperature control, compressor, evaporator coil, condenser water regulating valve and other system components required to provide proper air conditioning for the space designated on the Contract Drawings. Filter shall be Class 1, UL listed; 45% efficiency.
- AC Unit shall be furnished with the following accessories:
 - Condensate Pump
 - Disconnect Switch
 - Thermostat
 - Floor stand
 - Electric Reheat
 - Intra-Red humidifier

Schedule

Unit No.	Blower Motor	Auxiliary Total Cooling Cap.	Cooling Water (GPM)	Model	Total (WNET)
AC-3	12000	7.5	311000	85 Deg. F.E.W.T.	2590lbs.
AC-4	12000	7.5	311000	85 Deg. F.E.W.T.	2590lbs.

AC Unit motor shall be 3 phase and for 460 volts. (MEA No. 373-83-E)

- The Unit shall be factory run, tested and rated in accordance with ARI Standards.
- AC Unit shall be complete with water regulating valve. Valve shall be rated for 150 psi working pressure. Valve shall be Metrix WCCW type or an approved equal and have a positive shut-off.
- Unit shall be similar or equal to Leiberline, and rated at 150 lbs. working pressure.
- Vibration pad shall be "Shear Flex-Plate" as manufactured by Vibration Mountings Control Inc. or an approved equal.

PIPING AND ACCESSORIES

A. TEST REQUIREMENTS (Aux. Cooling Water)

Operating Pressure	150 PSIG
Operating Temperature	85 Deg. F - 95 Deg. F
Hydrostatic Test Pressure	1.5 x Operating Pressure
Duration of Test	2 hours

Isolate equipment, controls, instruments and valves from the piping system during hydrostatic tests

B. Piping & Fittings

System	Pipe	Fittings
Aux. Cooling Water	Black Steel Pipe, Conforming to ASTM A-53 Schedule #40 Grade B, Black Seamless	2-1/2" cast iron screwed 250 lb. class

A.C. Unit	Copper ASTM B-88	Wrought Copper Solder
Condensate Drain	Hard Temper Type (L)	5 ANSI B16.18

Domestic Water	Hard Temper Copper Type (TP) ASTM B302	Cast Bronze for Brazing - ANSI B16.18
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Vent auxiliary cooling water piping at all high points.

C. Accessories

- Unions for auxiliary cooling water service shall be similar and equal to 250 lb. class, malleable iron with bronze seats, Grinnell Figure 554, U.L.
- Nipples 6" length or less, shall be extra heavy and the material shall be the same as the pipe. Close nipples shall not be used.
- Braided type flexible connector shall be Vibration Mounting and Control Inc., (VICO) Model MFP Style NE Max. 280 psig or approved equal.

D. Soldered Joints

95-5 Tin-Antimony Solder having a melting point greater than 450 F. Excess solder shall be removed while still in the molten state with a file left at the face of the fitting.

E. Thermometers

- Thermometers for piping shall be of the "all angle" (universal), separate socket, industrial type with #304 stainless steel extension neck wells.
- The thermometer for auxiliary cooling shall operate at 0 - 200 Deg. F range and shall include a sufficient safety margin at either end.
- Thermometers shall be as manufactured by Albert A. Weiss, Weksler Instrument Co., Ashcroft or approved equal.

F. Pressure Gauges

- Pressure gauges shall be of the bourdon tube spring type with 4-1/2" dial sizes. Gauges shall have black aluminum cases with black numbers on white background. The gauges shall be as manufactured by Albert A. Weiss, Weksler Instrument Co. Ashcroft or approved equal.
- The pressure range for the auxiliary cooling, shall be 0 - 50 psi. and the Bourdon tube shall be Bronze.

G. Strainers

Strainers shall be similar and equal to those manufactured by Muller Steam Specialty Co. Screwed "Y" strainers for pipes 2-1/2" and smaller shall be 250 lb. No. 11. The screens for the strainers shall be stainless steel. Strainers shall be provided with capped blowdown valves.

H. Cutting and Patching, Sleeves and Escutcheons

- Pipe passing through walls shall have a trim opening cut no greater than necessary for the installation of a sleeve secured therein. Sleeves shall be 1/2" in diameter larger the outside diameter of the pipe or required insulation passing through, and of sufficient length to be flush with the finished wall surfaces. Sleeves shall be made of Schedule 40 galvanized steel pipe for concrete block partitions and 20 gauge sheet metal for framed partitions.
- Pipe passing through floor slabs shall have an opening core drilled 1/2" in diameter larger than the outside diameter of the pipe or required insulation passing through.
- Annular spaces between piping and sleeves or core drilled floor openings shall be packed with thermafiber and sealed to retain the fire integrity of the walls and floors with a non-hardening compound similar and equal to Uniseal or Duxseal as manufactured by J.M. Clippard Co.
- All piping passing through walls, floors or ceilings shall be fitted with chromium plated cast brass escutcheons with fastening set screws similar and equal to Fee & Mason Manufacturing Co., F & S Manufacturing Co. or Ritter Pattern and Casting Co.

I. Pipe Supports and Hangers

- All supports and parts shall conform to the latest requirements of the ANSI Code for pressure piping B31.10 and MSS standard practice SP-58.
- Hangers shall be manufactured by Grinnell Co., Central Iron, Fee and Mason, Blawknex Co. or an approved equal.
- Pipe hangers, rods, inserts and clamps shall be those approved for their respective uses by the Underwriters' Laboratories, Inc.
- Unless otherwise specifically approved, hanger size and spacing shall be:

Pipe Sizes	Max Hanger Spacing	Minimum Rod Sizes
steel 1/2" to 1"	12 ft. o.c.	3/8"
1-1/4" to 2"	9 ft. o.c.	3/8"
2-1/2" to 3-1/2"	10 ft. o.c.	1/2"
4" to 5"	12 ft. o.c.	5/8"
copper 1/2" to 1-1/4"	6 ft. o.c.	3/8"
1-1/2" to 2"	8 ft. o.c.	3/8"

J. Valves

Type	Size	Pressure	Jenkins Fig. No.	Crane Fig. No.	Stockham Fig. No.
Gate	Up to 2"	125 psi.	47U	428-UB	B-105
Gate	Up to 2"	150 psi.	49U	431	B-128
Gate	Up to 2"	300 psi.	280U	634E	B-144

- Balancing valves shall be non-lubricating eccentric plug (ballcentric) type with adjustable stop valve shall be rated for 175 lb.W.O.G. or 400 lb. W.O.G. Valves shall be as manufactured by Dezor Industries or approved equal.

3. Domestic Water

- Gate Valves - Fairbanks Fig. 0250-FB
- Check Valves - Fairbanks Fig. 0640-FB
- Pressure Reducing Valves - Cash Acme Type "EHR"
- Vacuum Breaker - Watts Regulator Co. Mod. No. 288A.C.

K. Pipe and Valve Identification

- Provide and affix a set of approved adhesive bands identifying the system and direction of flow.
- Each set shall consist of one band on which the name of the service is printed in letters not less than 1 inch high.
- Bands shall be in colors as indicated below and shall conform to ANSI Standard A-13.1.

System	Background	Letters and Arrow
Auxiliary Cooled Water	Green	Black

Adhesive bands shall be W.H. Brady Company, Saton Corp. or an approved equal.

- Place a durable metal or plexiglas tags permanently affixed to condenser water shut off valves indicating the tenant name, floor served, and "SUPPLY" or "RETURN". Tag shall be 3" x 6" size with black lettering on a green background.

Steel pipe threaded joints shall be made tight using only an approved pipe joint compound or tape, placed on the male thread only.

INSULATION FOR CONDENSATE WATER

Insulation: 1/2" thick one piece fiberglass, flame spread rating not greater than 25, smoke rating "50". (Insulate valves and fittings.)

EXHAUST FAN EXF-1

Shall be as manufactured by Greenheck corp. Model #BCF-110, 1200 CFM @ 15" ext. S.P., 1 hp motor.

VIBRATION MINIMIZERS

Vibration Hangers shall be as manufactured by Mason Industries, Vibration Mounting and Controls Inc. or an approved equal.

AUXILIARY DRAIN PAN REQUIREMENTS

- Make drain pan 12" larger than AC units on all four sides with upstanding sides 1 1/2" with 1/2" hem turned down outside of pan. Pans shall be made from 16 ga. galvanized steel with soldered corners made water tight.
- Install water sensor in drain pan along with necessary controls to sound local alarm and shutdown AC unit when activated by water in the pan.
- Water alarms shall be "Water Alert" Made By Dorlen, sensor unit model #SS-R (T), remote indicator unit model no. RI-2(T), power supply unit model PS-3 or approved equal. Locate alarms so that they can be easily heard in the occupied area.
- Place a durable metal sign permanently affixed to alarm identifying AC unit and to read "When Alarm sounds call 435-8515 weekdays & weekends."

EXECUTION

- All work in occupied tenant areas shall be performed on other than normal working hours as directed by the Engineer.
- The Contractor shall notify the Engineer when shut-down of existing systems becomes necessary. Shut-down time shall be kept to a minimum.

SHUTDOWNS

Request for shutdowns of main condenser water lines must be delivered to the Manager, WTC Operations, at least thirty (30) working days prior to the requested shutdowns and shall be subject to the final approval of the Manager, WTC Operations.

BALANCING

The Contractor shall provide the service of an air balancing and hydronic testing specialist who specializes in Heating, Ventilation and Air Conditioning systems. Perform all balancing in accordance with sheet metal and air conditioning Contractors National Association (SMACNA).

SUBMITTALS

Submit for approval three (3) sets of shop drawings of piping. Submit three (3) sets of catalog cuts A.C. Unit, valves and accessories and three (3) copies of air balancing data report.

APPLICABLE STANDARDS, CODES AND PUBLICATIONS

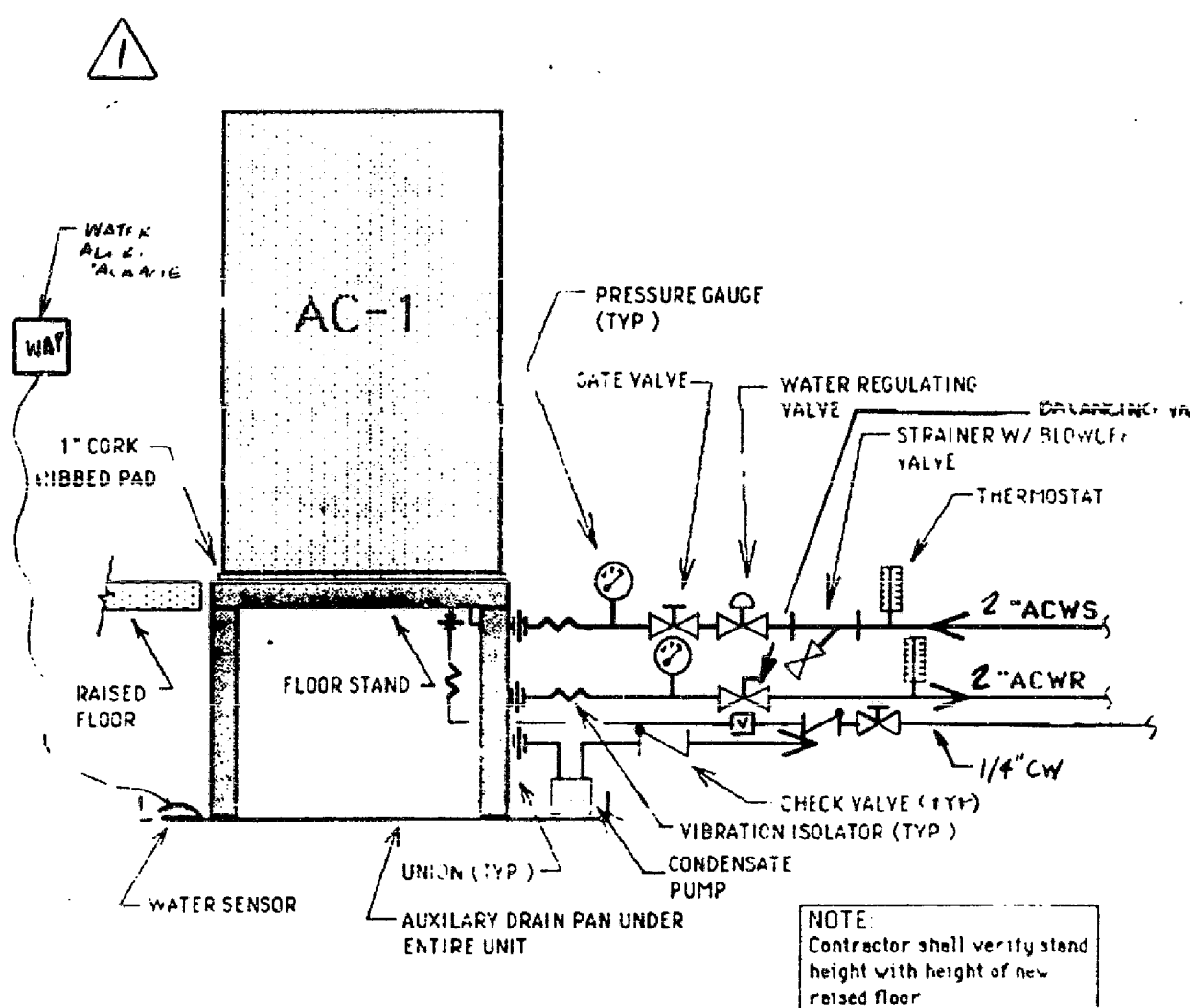
This entire installation shall be manufactured, tested and installed to conform, as a minimum, to provisions of the following codes and standards except where stricter requirements are specified elsewhere herein or shown on the contract drawings.

- National and New York Electrical Code
- National Fire Protection Association (N.F.P.A.)
- New York City Building Code
- Underwriters Laboratories, Inc. (U.L.)
- American National Standards Institute Inc. (A.N.S.I.)

CONTROLLED INSPECTION

a. The ventilation system shall not be placed in operation until it has been tested and inspected in accordance with the requirements of the New York City Building Code, section C26-1301.2.

b. The controlled inspection shall be made and witnessed by a licensed professional engineer, employed by the contractor, who shall be approved by the Engineer-of-Record, as part of the work of the sub-contract.



AC UNIT PIPING SCHEMATIC
NO SCALE

ESTIMATED SUPPLEMENTAL COOLING LOAD

The estimated supplemental cooling load for this Tenant Alteration Application is 47.8 Tons.

SEQUENCE OF OPERATION AC-3 & AC-4

- When unit is "OFF" fan and compressors shall be shutdown and the water regulating valve shall be closed.
- When unit is "ON" fans shall run continuously and compressors shall cycle to provide cooling as called for by the "built-in" thermostat.

SEQUENCE OF OPERATION EXF-1

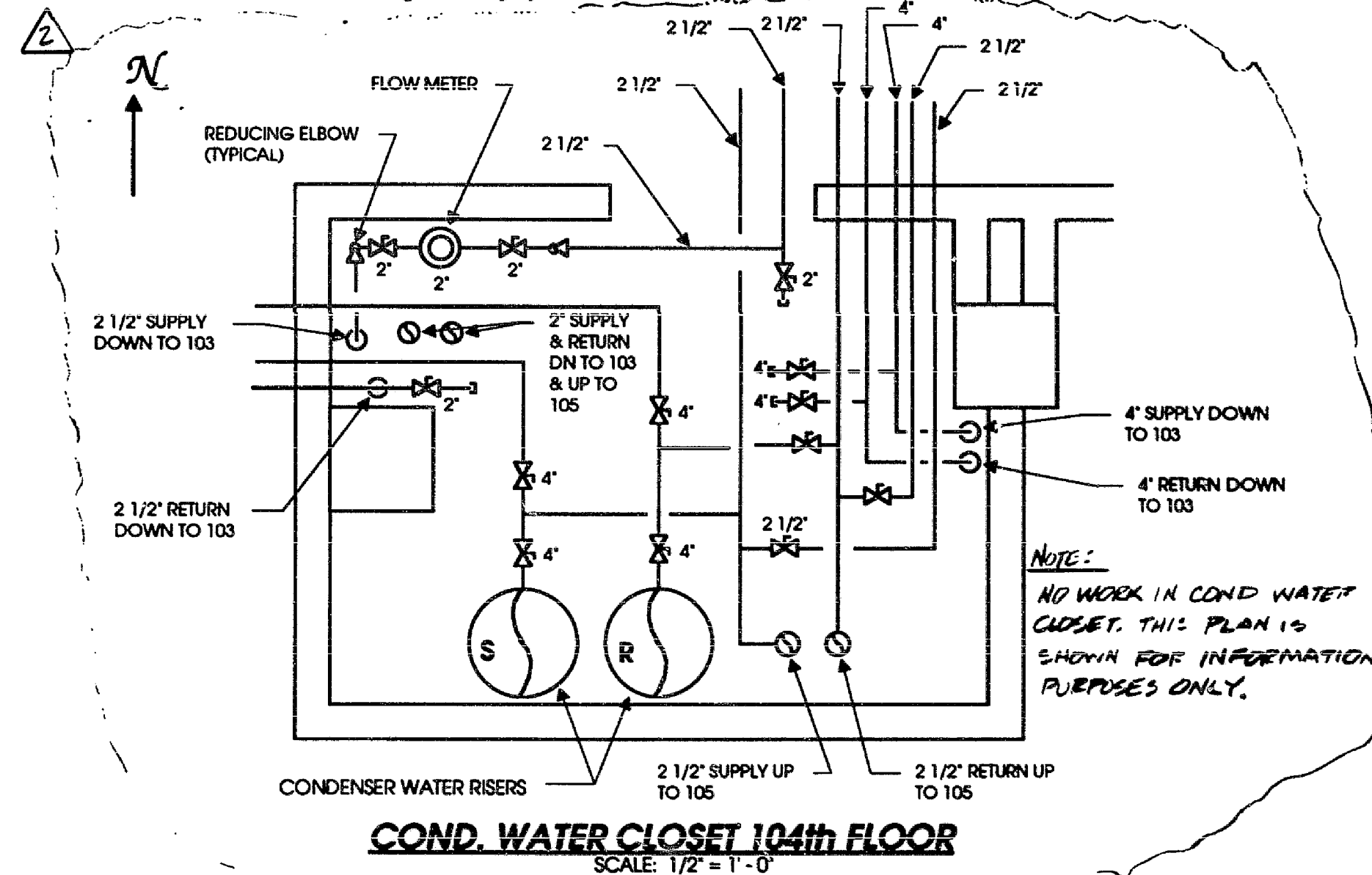
- When the switch is "ON" motorized damper M-1 shall be open and EXF-1 shall run continuously.
- If a smoke condition exists the smoke detection panel shall shutdown fan EXF-1 and close motorized damper M-1.

SPRINKLER SPECIFICATIONS

- Shutdown of existing system: At the time that such closing or opening of valves and draindown becomes necessary, the Contractor shall notify the WTC Construction Division (at least 45 hours in advance) who will make the necessary arrangements. The Contractor shall keep the shutdown time to a minimum and drainage shall be to a properly connected receptacle without causing damage to other work and property.
- Heads: Sprinkler Heads shall be Reliable Automatic Sprinkler Co. concealed type Model "G4", 165 degree F rating, 1/2" orifice or approved equal. Polished chrome.
- Pipe and Fittings: Piping shall be Schedule 40, standard weight, black steel pipe, ASTM standard A755. Fittings shall be cast iron, 175 lbs. class threaded.
- All horizontal piping parallel to and within 15'-0" of exterior walls shall be insulated with 1" fiberglass insulation.
- Piping and fittings shall be insulated where required by the contract drawings with one inch (1") thick heavy density fiberglass pipe covering with factory applied all service jacket (ASJ), self-sealing lap and butt strips bonded with aluminum straps (2" on centers), and premolded fiberglass for fittings. Insulation shall be similar in all respects to that manufactured by Owens-Corning Fiberglass. Insulation (including jacket or facing and adhesive) shall have a flame spread rating not greater than 25, smoke developed rating 50.
- Piping shall be installed to drain back to flow control valve.
 - Loop main shall be above bottom chord of truss.
 - Branch lines shall run through bridging trusses.
- Flushing: Before final connections and sprinkler heads are installed, all piping shall be thoroughly blown out, rodged out, and washed out at least twice in a manner as directed by the Engineer to remove all accumulation of dirt, chips or other deleterious material. Make all temporary connections and furnish all appliances required for the purpose of cleaning at no extra expense to the Authority.
- Pipe passing through walls shall have a trim opening cut no greater than necessary for the installation of a sleeve secured therein. Sleeves shall be made of Schedule 40 galvanized steel pipe for floor slabs and 20 gauge sheet metal for framed partitions. Sleeves shall be 1/2" in diameter larger the outside diameter of the pipe or required insulation passing through, and of sufficient length to be flush with the finished wall surface. Annular spaces between piping and sleeves or core drilled floor openings shall be packed with thermafiber and sealed to retain the fire integrity of the walls and floors with a non-hardening compound similar and equal to Uniseal or Duxseal as manufactured by Johns Manville Co.
- Hangers: Install suitable clevite type hangers supported from the existing building steel framing. Drilling/anchoring systems will be permitted. Drilling only when approved by the Engineer. Use Hilti HDU anchors.

Pipe Size	Max. Hanger Spacing	Min. Rod Size
1"	8'-0" O.C.	3/8"
1-1/4" to 2"	10'-0" O.C.	3/8"
2-1/2" to 3"	12'-0" O.C.	1/2"

- All piping shall be installed above the bottom chord of the trusses.
- Test: Entire installation shall be tested hydrostatically and remain tight with no loss of pressure for a period of no less than two (2) hours against a pressure of 200 psig. Remaining portion of the floor system shall be isolated from the testing procedure.
- Code: Entire installation shall comply with all provisions of the NYC Building Code.
- Affix identification markers on all sprinkler piping. Markers shall be at 10' - on centers. Markers shall be Brady Snap-On, Type 8, W.H. Brady Co. Sign Mark Division, Markers shall read "SPRINKLER PIPING".
- Disturbance of structural fireproofing shall be kept in a minimum and precaution shall be observed for work above the ceiling.
- Contractor shall submit detailed shop drawings to the Engineer for approval. No work shall commence until approval is obtained.
- All unused piping, ductwork, hangers, supports, shall be completely removed all the way back to the core riser closet, or back to the nearest branch main and capped, sealed watertight or airtight. All the openings shall be properly patched, sealed, and fire stopped to maintain the original integrity of the partition's fire rating.



COND. WATER CLOSET 104th FLOOR
SCALE: 1/2" = 1'-0"

REV.	DESCRIPTION	DATE
REV. #1	REVISED AS PER P.A. COMMENTS	6/23/92
REV. #2	REVISED AS PER P.A. COMMENTS	6/26/92
REV. #3	REVISED AS PER P.A. COMMENTS	6/26/92
Cantor Fitzgerald Securities One World Trade Center Floor 104 New York, NY 10048 H.V.A.C. SPECIFICATIONS, DETAIL # SPRINKLER SPECIFICATIONS John C. Westrick & Associates CONSULTING ENGINEERS 2110 Maple Avenue South Plainfield, NJ 07080 (201) 561-4170 Fax (201) 753-8584		
SCALE: NONE DWN BY: PE CHK'D BY: JCW DATE: 2/28/92 JOB NO. 92104		